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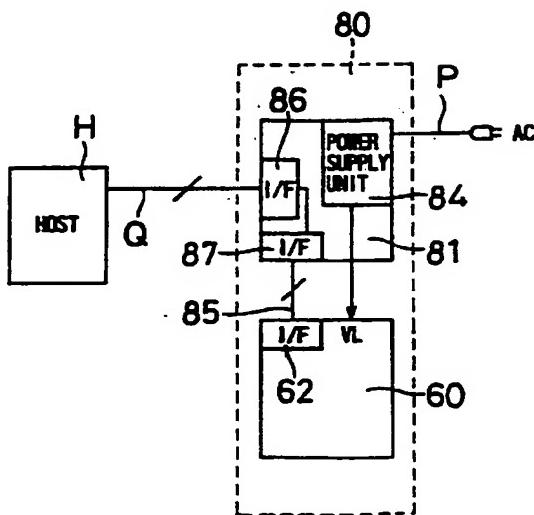
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(54) PRINTER

(57) A printer 80 integrally comprises a printing section 81 for printing on a recording medium such as a cut sheet S and continuous paper L2 based on printing data transmitted from an external host unit H, a control panel 70 containing an indicator section for indicating operating states of the printing section 81, a display panel 60 for displaying data transmitted from the host unit H to the printing section 81 and instructed to be displayed, an interface 86 for transmitting/receiving signals between the host unit H and the printing section 81 and interfaces 87 and 62 for transmitting/receiving signals between the printing section 81 and the display panel 60. It is possible to securely prevent disagreement of printed content and displayed content and to realize down-sizing and simplification of the system structure by constructing as described above.

FIG. 6



Description**Technical Field**

[0001] The present invention relates to a printer for printing on cut sheets, continuous paper and the like.

Background Art

[0002] A cut sheet such as an ordering slip and a receipt slip is called a slip sheet and there has been known a slip printer for printing on such sheets by manually supplying the sheet from the front or side of a printing section (for instance, Japanese Unexamined Utility Model Publication JP-U 62-150148 (1987), Japanese Examined Utility Model Publication JP-Y2 2-8781 (1990)).

[0003] Some shops and restaurants adopt a method of printing on the slip sheets at the payment of a charge by the slip printer set on a cashier counter with the use of information such as a name and unit price of the merchandise, stored in a computer in advance. It has an advantage that a necessary number of duplicates of the slip sheet may be printed at the same time with the same contents for the shop, for a clerk and for a customer. A plurality of duplicates is often required also when payment is made by a credit card.

[0004] In addition to the slip printer, a printer for issuing a receipt needs to be provided because there are customers who ask for a receipt beside such a duplicate. However, because the cashier counter gets crowded when the same kinds of two printers are placed side by side, a combination printer in which the both functions are combined is now on the way of development to cope with this problem.

[0005] Further, as peripheral equipment of the computer, it is now considered to construct a system for preventing a mistake in relation to the payment in which a display for confirmation is separately provided.

[0006] Fig. 9 is a block diagram showing an example of prior art accounting system. A host unit 3 comprising a computer and others stores a large amount of data such as a name and unit price of merchandise, and others which are inputted from a keyboard, and the like or which are transmitted from another host unit.

[0007] A printer 1 is connected with the host unit 3 by a signal cable 4 in a serial transmission system such as RS232C and Ethernet or in a parallel transmission system such as Centronics and SCSI. The printer 1 is provided with an interface 1a adapted to these transmission systems. When the host unit 3 transmits printing data and commands to the printer 1, the printer 1 analyzes the data and commands to execute a corresponding printing operation. The printer 1 has a power supply unit 1b and a power cable 1c to receive power from commercial power (e.g., 100 V AC).

[0008] A display unit 2 is connected with the host unit 3 by a signal cable 5 in the serial transmission system

such as RS232C and is provided with an interface 2a adapted to the transmission system. When the host unit 3 transmits display data and commands to the display unit 2, the display unit 2 analyzes the data and the commands to execute a corresponding display operation. The display unit 2 has a power supply unit 2b and a power cable 2c to receive power from commercial power (e.g., 100 V AC).

[0009] Although the degree of freedom of the prior art system structure is high because the printer 1 and the display unit 2 are installed independently, this system structure requires two power supply units and two signal cables in total. Therefore, when the host unit 3 is installed at the distant location, the signal cables become lengthy, and also the system occupies two power sockets.

[0010] Further, because the printer 1 and the display unit 2 are separate units, the total floor area increases and the cashier counter gets crowded when they are put on the cashier counter side by side.

[0011] Still more, when contents to be printed by the printer 1 are to be displayed on the display unit 2, too, the host unit 3 needs to transmit relevant data to both the printer 1 and the display unit 2, with the result that the burden of the host unit 3 increases and there may arise a problem where data transmitted to the both are different from each other.

Disclosure of Invention

[0012] An object of the present invention is to provide a printer capable of securely preventing disagreement between printed contents and displayed contents, which accomplishes downsizing and simplification of the system structure.

[0013] The invention provides a printer comprising:

- 40 a first interface section for electrically connecting the printer with an external host unit;
- 45 a first display section for displaying an operating state of the printer;
- 50 a command identifying section for identifying a command type of data transmitted from the external host unit;
- 55 a printing data control section for processing data which is determined as printing data by the command identifying section;
- 55 a display data control section for processing data which is determined as display data by the command identifying section;
- 55 a printing mechanism for printing on a recording medium based on the printing data from the printing data control section; and the printing section and the second display section for displaying the printing data transmitted to the printing section, it is possible to display information for an operator of the printer, e.g., paper out, paper jam, on-line and off-line and others, on the first display section and to

display information for a person on the other side such as a customer, e.g., printed contents such as names and prices of the goods, on the second display section.

[0014] Further, since the second interface section for transmitting/receiving signals is provided between the printing section and the second display section and therefore the signal cable for connecting the external host unit with the first interface section suffices for operation, the cost will not increase even when the external host unit is installed at a distant location.

[0015] By integrating the printing section, the first display section, the second display section, the first interface section and the second interface section, it is also possible to downsize and simplify the whole structure.

[0016] In the invention it is preferable that the second display section is detachably mounted on a body of the printer.

[0017] According to the invention, since the second display section is detachable from the body of the printer, it is possible to remove the second display section from the body of the printer when it is not necessary and the degree of freedom of the system structure is not decreased.

[0018] In the invention it is preferable that the data transmitted from the external host unit is used in common as both printing data and display data.

[0019] According to the invention, it is possible to securely prevent disagreement between printed contents and display contents by using the common data transmitted from the external host unit for both printing data and display data. Still more, since it is not necessary to transmit the same data by many times, enhancement in data transmission rate and reduction in data transmission time can be accomplished.

[0020] In the invention it is preferable that electric power to the second display section is supplied from a power circuit provided in the printing section.

[0021] According to the invention, since the second display section needs no power circuit and power cable, the number of parts is reduced, thereby accomplishing downsizing and cost-reduction of the apparatus.

[0022] In the invention it is preferable that the printing section contains a first printing unit for printing on a cut sheet and a second printing unit for printing on continuous paper.

[0023] According to the invention, since the printer can print on a plurality of kinds of paper such as cut sheets and continuous paper, it can print a duplicate of a slip sheet and issue a receipt at the same time and hence is suitable for an accounting system and others.

Brief Description of Drawings

[0024]

Fig. 1 is a perspective view showing a printer of the

present invention.

Fig. 2 is a perspective view showing the printer of the invention.

Fig. 3 is a perspective view showing the printer of the invention:

Fig. 4 is a perspective view showing the printer of the invention.

Fig. 5 is a diagram showing the internal structure of the printer.

Fig. 6 is a block diagram showing a system structure using the printer of the invention.

Fig. 7 is a block diagram showing the electrical structure of the printer 80.

Fig. 8 is a flowchart showing operations of the printer.

Fig. 9 is a block diagram showing one example of a prior art accounting system.

Best Mode for Carrying Out the Invention

[0025] Figs. 1 through 4 are perspective views showing a printer of the present invention, wherein Fig. 1 is a perspective view thereof, seen from the front left direction, in the state when a cover is closed, Fig. 2 is a perspective view thereof, seen from the front left direction, in the state when the cover is opened, Fig. 3 is a perspective view thereof, seen from the rear right direction, in the state when the cover is closed, and Fig. 4 is a perspective view thereof, seen from the rear left direction, in the state when the cover is opened.

[0026] In Fig. 1, the printer has a lower housing 10 and an upper housing 50. A cover 51 is pivotally supported at the rear end side of the upper housing 50. A discharge port 52 for discharging printed continuous paper L2 is formed at the upper surface of the cover 51.

[0027] A cut sheet S is composed of a plurality of duplicates and the like and is inserted from a slit opening W provided at the side of the apparatus or from the front side. After setting it on a table 11 having a horizontal plane, printing is carried out while conveying it in the direction of A. It is taken out from the opening W or the front side again after the printing.

[0028] A display panel 60 having a display section 61 for displaying data sent from the external host unit is provided so as to face to the rear direction at the right rear corner of the printer as shown in Fig. 3. The display panel 60 is attached to be detachable and swingable and is turned toward the rear side to allow customers to confirm data when the printer is set on the cashier counter. The display section 61 comprises a dot-matrix or 7-segment liquid crystal panel, a light emitting diode array or the like.

[0029] A control panel 70 is provided at the front right side of the table 11 on the upper surface of the lower housing 10 and membrane type switches 71 and 72 and indicator lamps 73 through 75 of light emitting diode are disposed thereon. They function as follows. The printer starts a receipt issuing operation when the switch 71 is

pressed and starts an operation for printing the cut sheet S when the switch 72 is pressed. When the indicator lamp 73 lights continuously, it indicates that the printer is power-on state and when the lamp flashes, it indicates that the cut sheet S is being conveyed in. When the indicator lamp 74 lights continuously, it indicates that the cut sheet S is being conveyed out and when the lamp flashes, it indicates a warning of the printer. When the display lamp 75 lights continuously, it indicates that the cut sheet S is released and when the lamp flashes, it indicates that the printer is off-lined with the external host unit.

[0030] As shown in Fig. 2, a printing unit 20 having an impact type printing head is provided above the table 11 and a ribbon cassette 21 is set removably thereon. A thermal recording printing unit 30 is provided above the printing unit 20 and a cutter unit 31 for cutting continuous paper L2 printed by the printing unit 30 is mounted thereon in a manner angularly displaceable. A wide space is assured when a cover 51 is opened. A roll of paper L1 for supplying the continuous paper L2 to the printing unit 30 is removably set therein.

[0031] Fig. 5 shows the internal structure of the printer. The table 11 for supporting the cut sheet S is provided horizontally. A transmission type photo sensor PS for detecting whether or not the cut sheet S exists and the edge thereof, rollers 26 and 27 for conveying the cut sheet S in the front and in the rear directions and a platen 25 facing to the printing head 22 are provided on the way of the path for transferring the cut sheet S. The rollers 26 and 27 are driven by a motor 28 via a transmission mechanism (not shown). The printing head 22 is held by a guide 23 so as to be able to reciprocate in the width direction (vertical to the surface of the figure) of the cut sheet S and is driven by a motor 24 via a transmission mechanism (not shown). The printing unit 20 constructed as described above is mounted in front of a vertical frame 13.

[0032] The thermal recording printing unit 30 is mounted on the vertical frame 13 so that it comes above the printing unit 20 and comprises a printing head 32 composed of a line type thermal head 32 and a platen roller 33 therein. The cutter unit 31 for cutting the continuous paper L2 discharged out of the printing unit 30 is attached further above the printing unit 30 in a manner angularly displaceable and is provided with a cutter blade 31a therein. Because the cutter unit 31 cuts the continuous paper L2 automatically when the printing unit 30 ends its printing, it is possible to eliminate a tear bar or the like.

[0033] The cover 51 is pivotably supported in a manner angularly displaceable. The roll of paper L1 is removably held by a roll of paper holding member 53 integrally formed with the cover 51 so as to be coaxial with a rotation axis of the cover 51. The continuous paper L2 supplied from the roll of paper L1 is discharged out of a discharge port 52 formed at the upper surface of the cover 51 via the printing unit 30 and the

cutter unit 31.

[0034] A floor area of the apparatus may be reduced considerably by disposing the printing unit 30 for printing the continuous paper L2 above the printing unit 30 for printing the cut sheet S as described above. Further, the roll of paper L1 is disposed behind the vertical frame 13 and the printing unit 30 is disposed at the upper side of the two-story structure, thereby the distance between the printing unit 30 and the roll of paper L1 may be kept long, thus facilitating setting/removing the roll of paper and inserting and attaching the continuous paper. Still more, it is easy to take out receipts because the discharge port 52 of the continuous paper L1 is located near the front face of the apparatus and at the high position.

[0035] Fig. 6 is a block diagram showing the structure of a system using the inventive printer. A host unit H comprising a computer and others stores a large amount of data such as a name and unit price of the merchandise, and others which are inputted from a keyboard, a bar-code reader and the like or which are transmitted from another host unit.

[0036] A printer 80 is connected with the host unit H by a signal cable Q in the serial transmission system such as RS232C and Ethernet or in the parallel transmission system such as Centronics and SCSI. The printer 80 is provided with an interface 86 adapted to these transmission systems. The printer 80 is connected with the display panel 60 by a signal cable 85 in the serial transmission system in TTL level and the both are provided with interfaces 87 and 62 adapted to the transmission system. A connector (not shown) is provided on the way of the signal cable 85 to connect/disconnect the signal cable 85 in accordance to attaching/detaching the display panel 60.

[0037] The printer 80 has a power supply unit 84 and a power cable P to receive power from commercial power (e.g. 100 V AC). The display panel 60 receives power from the power supply unit 84.

[0038] Data is transmitted/received and power is supplied by the signal cable 85 between the printer 80 and the display panel 60. Because the printer 80 and the display panel 60 are connected by one connector, the display panel may be attached/detached readily and freely.

[0039] Fig. 7 is a block diagram showing the electrical structure of the printer 80. The printer 80 integrally comprises a printing section 81 for printing on a recording medium based on printing data transmitted from the host unit H, a control panel 70 for displaying the operating state of the printing section 81 and the display panel 60 for displaying data transmitted from the host unit H to the printing section 81 and instructed to be displayed.

[0040] The printing section 81 comprises the interface 86 for transmitting/receiving signals between the host unit H, a CPU (central processing unit) 88 for controlling the operation of the printing section 81 based on a pre-determined program, an ROM (read-only memory) 89

storing programs and data, a RAM (random access memory) 90 storing data temporarily, a control circuit 91 for controlling an operation of a printing mechanism section 93, a bus 92 for connecting them each other, and the like. The interface 87 for transmitting/receiving signals between the display panel 60 is configured so as to be connected directly to the CPU 88.

[0041] The printing mechanism section 93 has the impact type printing head 22, the thermal recording printing head 32, the motors 24 and 28, the cutter unit 31, the photo sensor PS and others as shown in Fig. 5 (partly omitted in Fig. 7) and is provided with a driving circuit 94 for driving them.

[0042] The power supply unit 84 has a power circuit 83 for transforming voltage of and rectifying the commercial power supplied via the power cable P and generates power voltage VH (24 V DC for example) for the printing mechanism section 93. A DC-DC converter 82 at the latter stage converts the power voltage VH into power voltage VL (5 V DC for example) for logical circuits to supply to the logical circuits of the printing section 81 and the display panel 60.

[0043] The control panel 70 is connected electrically with a bus 92 of the printing section 81 and comprises a control section composed of the above-mentioned switches 71 and 72 and the display section composed of the indicator lamps 73 through 75.

[0044] The display panel 60 comprises the interface 62 for transmitting/receiving signals between the printing section 81, a CPU 63 for controlling the operation of the display panel 60 based on a predetermined program, an ROM 64 storing programs and data, an RAM 64 storing data temporarily, a control circuit 65 for controlling the operation of the display section 61, a bus 66 for connecting them each other, and the like.

[0045] Fig. 8 is a flowchart showing the operation of the printer. When the power supply of the printer is turned ON, a display data process for displaying the operating state of the printer 80 on the control panel 70 is executed in Step s2 after initializing the printer 80 in Step s1. Next, Step s3 stands by in a loop until when the printer 80 gets BUSY state. The printer 80 gets BUSY when it receives some data from the host unit H.

[0046] Control commands transmitted by the host unit H are structured in the following format for example.

- a) Data transmitting command ESC CR n 1B 0A (where, n = 00H (hexadecimal notation), 10H, 03H, 13H)
- b) Display panel setting command ESC S
- c) Display panel releasing command ESC G

[0047] In the data transmitting command, the host unit H adds actual data after transmitting the processing code n indicating the data processing contents following to the escape code ESC and the carriage return code CR in the ASCII code. Here, n = 00H indicates receipt printing data, n = 10H indicates receipt printing and dis-

play panel display data, n = 03H indicates slip sheet printing data and n = 13H indicates slip sheet printing and display panel displaying data.

5 [0048] A combination of the display panel setting command and the display panel releasing command is prepared as display panel dedicated commands. The transmitted actual data is displayed only on the display panel 60 and is not printed when the host unit H transmits the escape code ESC and the character code S, then the actual data and finally the escape code ESC and the character code G.

10 [0049] Next, when the command of the host unit H contains the printing command in Step s4, the process advance to Step s5 to execute a corresponding printing data process. When the command of the host unit H contains a display command of the display panel 60 on the other hand, the process advances to Step s7 to execute the display data process. When the command is a command other than that, the process returns to Step 15 s3 to stand by after executing a corresponding process in Step s8.

20 [0050] Thus, the printer executes the printing process of the cut sheet S, the printing process of the continuous paper L2, the displaying process of the display panel 60 and others solely or concurrently corresponding to the command transmitted from the host unit H. Customers can confirm the printed contents of the cut sheet S or the continuous paper L2 readily and reliably by displaying them on the display panel 60. Further, because the 25 actual data transmitted from the host unit H is used not only for printing but also for display when the code n showing the data processing content is 10H or 13H, it is possible to reduce the burden of the host unit H and to 30 securely prevent disagreement between the printed content and the displayed content from occurring.

Effect of Invention

35 [0051] As described above in detail, according to the present invention, it is possible to display information for the operator of the printer, e.g., paper out, paper jam, on-line and off-line and others, on the first display section and to display information for a person on the other side such as a customer, e.g., the printed contents such as a merchandise name and price, on the second display section.

40 [0052] By integrally providing the printing section, the first display section, the second display section, the first interface section and the second interface section and 45 by connecting the printing section and the second display section by the signal cable and the power cable, it is not only possible to downsize and simplify the whole apparatus and reduce the cost thereof, but also to 50 reduce the burden of the host unit and make the printed contents agree securely with the displayed content.

Claims

1. A printer integrally comprising:

a printing section for printing on a recording medium based on printing data transmitted from an external host unit; 5
a first display section for displaying an operating state of the printing section;
a second display section for displaying display data transmitted from the external host unit to the printing section; 10
a first interface section for electrically connecting the external host unit with the printing section and exchanging signals therebetween; and
a second interface section for electrically connecting the printing section with the second display section and exchanging signals therebetween. 15

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2. The printer of claim 1, wherein the second display section is detachably mounted on a body of the printer.
3. The printer of claim 1, wherein the data transmitted from the external host unit is used in common as both printing data and display data. 25
4. The printer of claim 1, wherein electric power to the second display section is supplied from a power circuit provided in the printing section. 30
5. The printer of any one of claims 1 to 4, wherein the printing section contains a first printing unit for printing on a cut sheet and a second printing unit for printing on continuous paper. 35

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FIG. 1

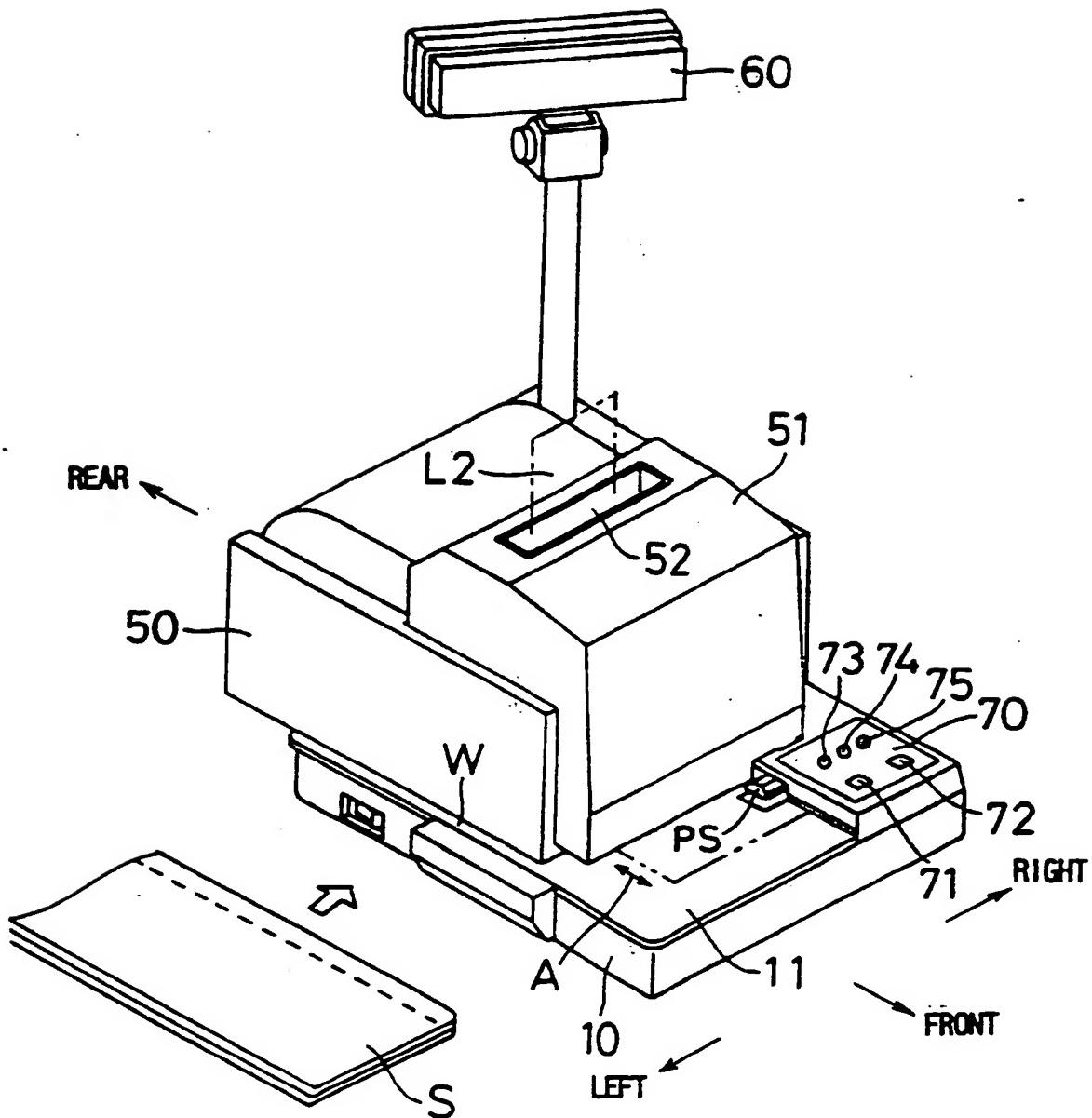


FIG. 2

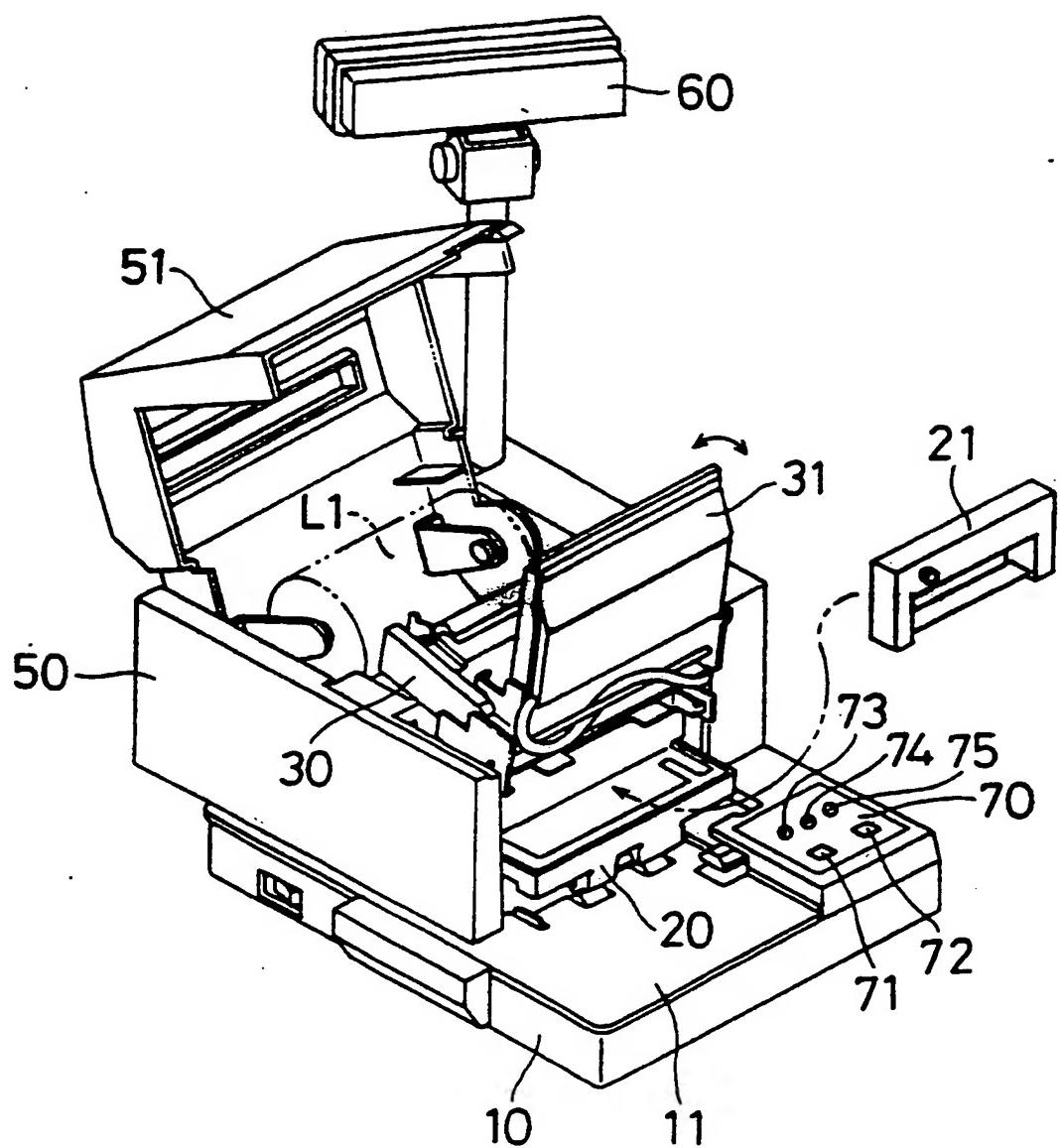


FIG. 3

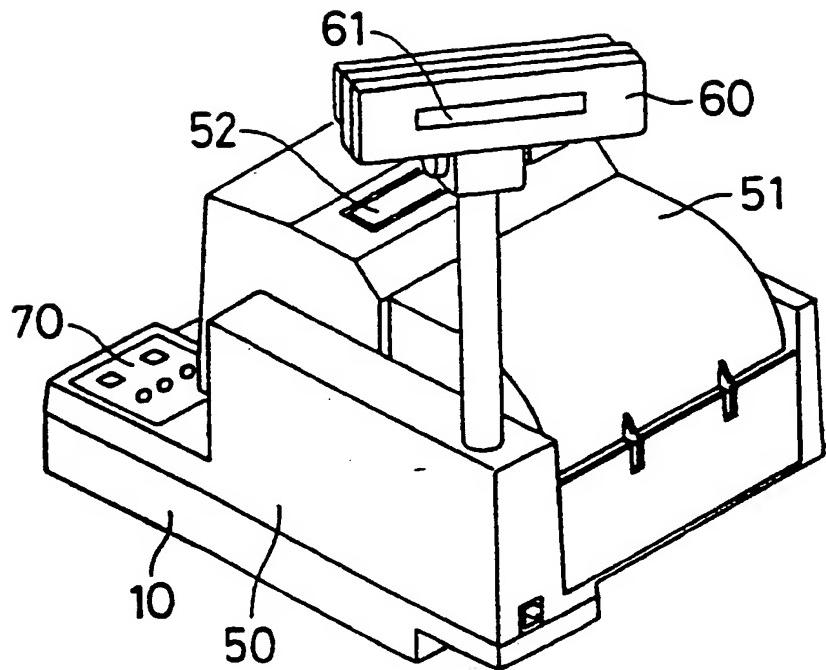


FIG. 4

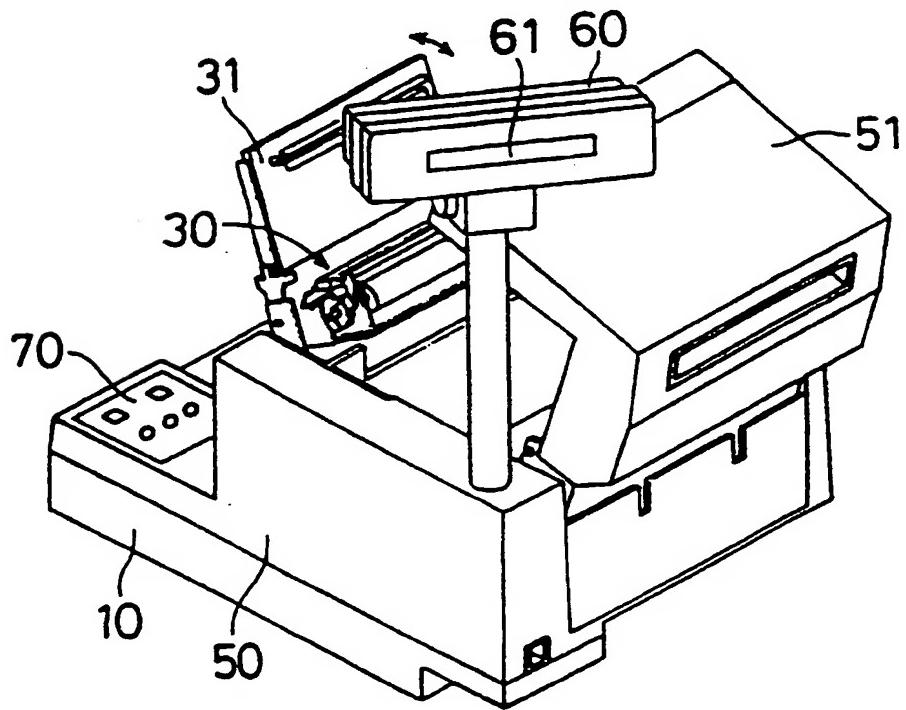


FIG. 5

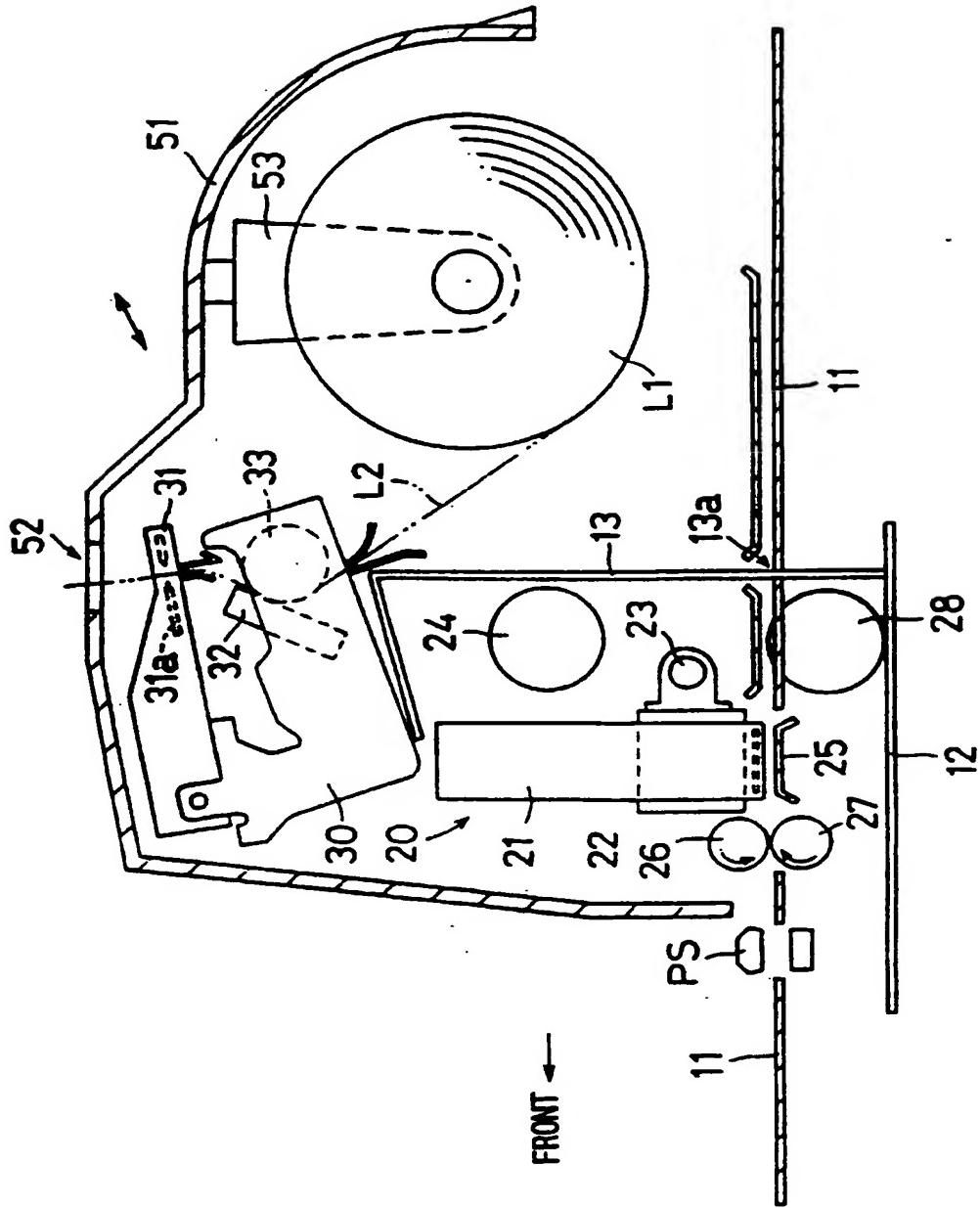


FIG. 6

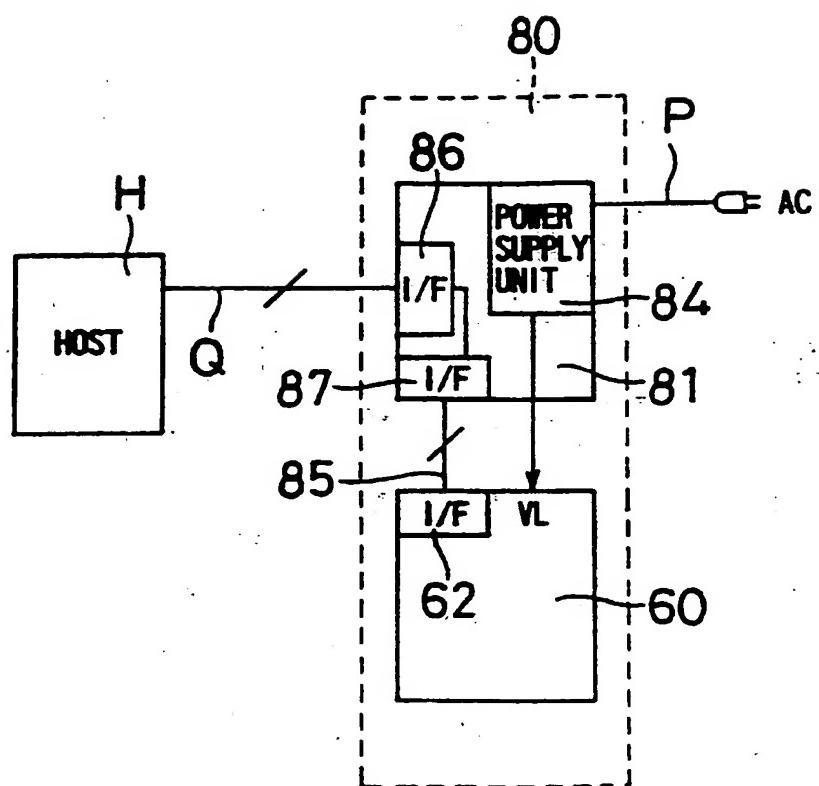


FIG. 7

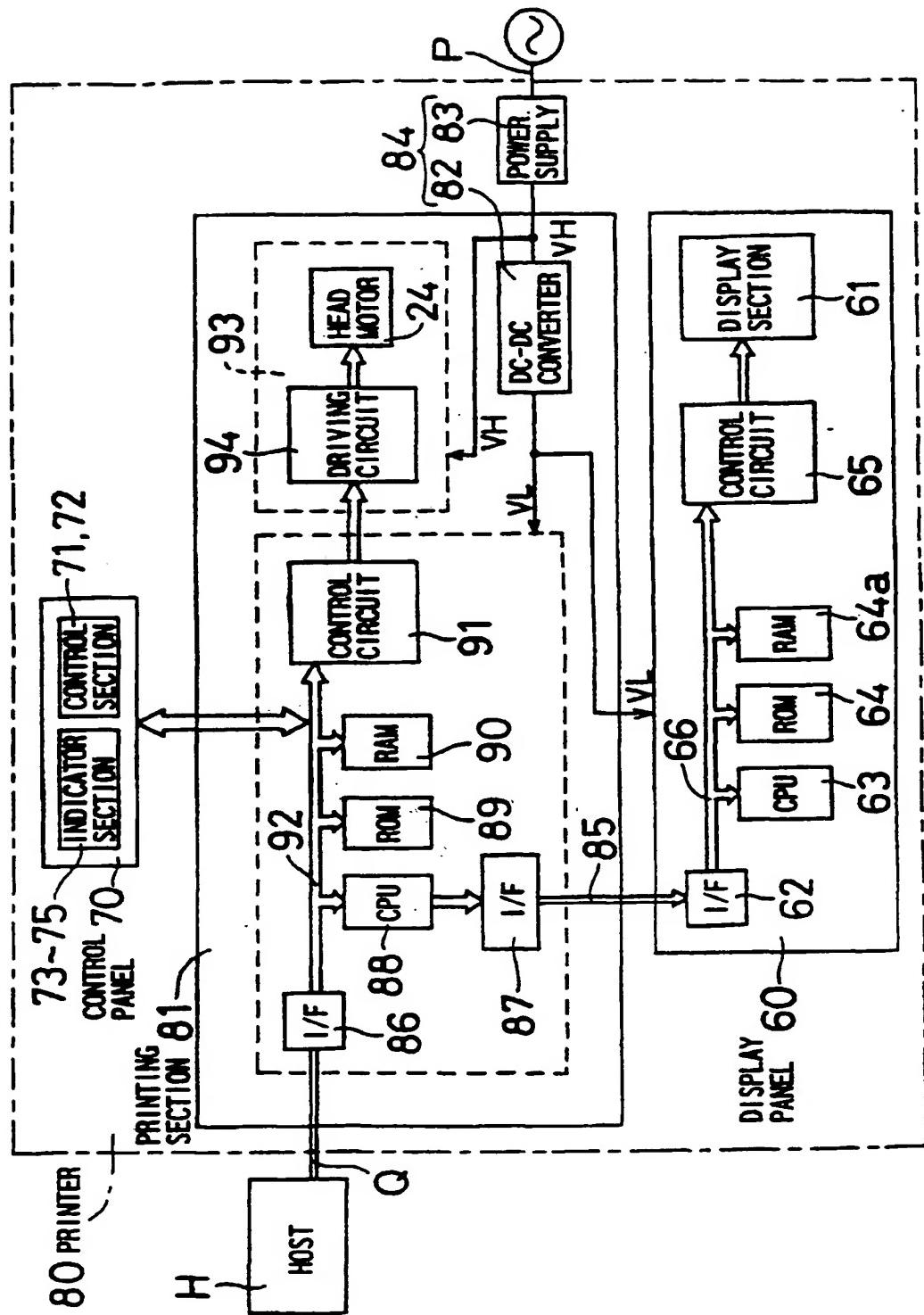


FIG. 8

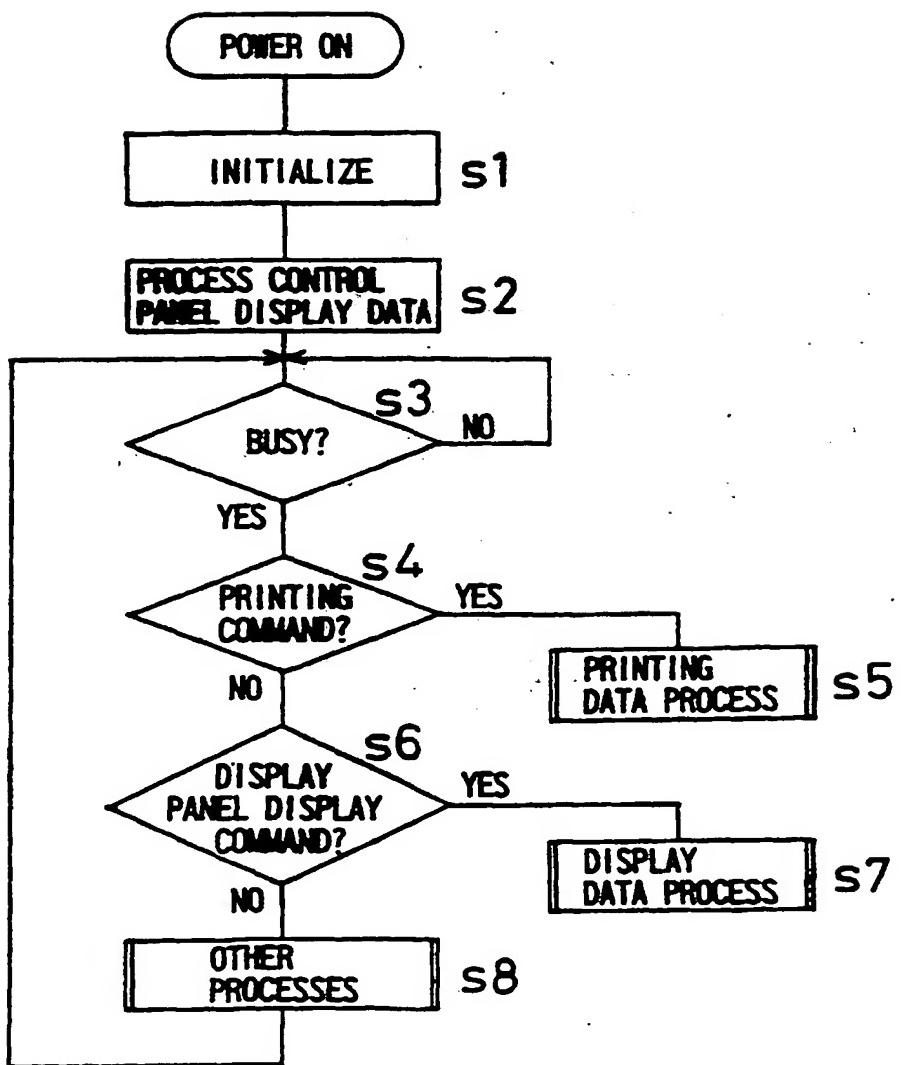
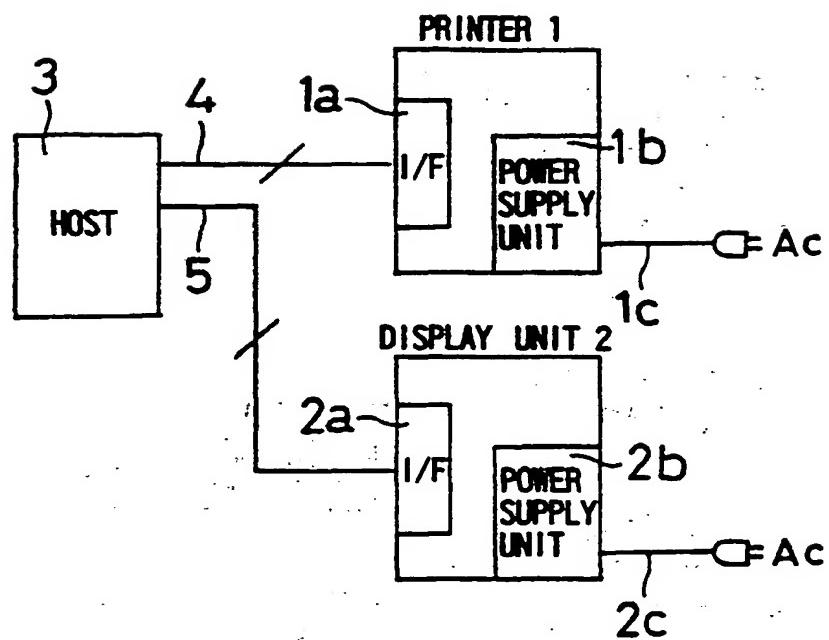


FIG. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP97/03941

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl⁶ B41J29/00, B41J29/42

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int. Cl⁶ B41J29/00, B41J29/42, G06F3/12, G07G1/01, 301

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1940 - 1996	Jitsuyo Shinan Toroku
Kokai Jitsuyo Shinan Koho	1971 - 1998	Kohō 1996 - 1998
Toroku Jitsuyo Shinan Koho	1994 - 1997	

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP, 4-265776, A (Ricoh Co., Ltd.), September 21, 1992 (21. 09. 92), Page 3, column 3, line 41 to column 4, line 18 (Family: none)	1, 3, 4 2, 5
X	JP, 6-24048, A (Canon Inc.), February 1, 1994 (01. 02. 94), Page 2, column 2, line 5 to page 3, column 3, line 27 (Family: none)	1, 3, 4 2, 5
X	JP, 7-23556, U (Meidensha Corp.), May 2, 1995 (02. 05. 95), Page 2	1, 3, 4 2, 5
Y	JP, 1-177694, A (TEC Corp.), July 13, 1989 (13. 07. 89), Page 2, lower right column, line 2 to page 3, lower left column, line 9 (Family: none)	2, 5

 Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search

January 20, 1998 (20. 01. 98)

Date of mailing of the international search report

February 3, 1998 (03. 02. 98)

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INTERNATIONAL SEARCH REPORT

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP, 1-133685, U (Omron Corp. and another), September 12, 1989 (12. 09. 89), Page 1 (Family: none)	2, 5